

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

Parameters	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	15	V
Collector-Emitter Voltage	$V_{CES}$	40	V
Collector-Base Voltage	$V_{CBO}$	40	V
Emitter-Base Voltage	$V_{EBO}$	4.5	V
Collector Current (10 $\mu$ s pulse)	$I_{C(PEAK)}$	500	mA
Collector Current – Continuous	$I_C$	200	mA
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	0.36 2.06	W mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 100^\circ\text{C}$ Derate above $100^\circ\text{C}$	$P_D$	0.68 6.85	W mW/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	486	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	147	$^\circ\text{C}/\text{W}$

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameters	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage ( $I_C = 10\mu\text{A}, V_{BE} = 0$ )	$V_{(BR)CES}$	40	-	V
Collector-Emitter Sustaining Voltage <sup>(1)</sup> ( $I_C = 10\text{mA}, I_B = 0$ )	$V_{CEO(sus)}$	15	-	V
Collector-Base Breakdown Voltage ( $I_C = 10\mu\text{A}, I_B = 0$ )	$V_{(BR)CBO}$	40	-	V
Emitter-Base Breakdown Voltage ( $I_C = 10\mu\text{A}, I_C = 0$ )	$V_{(BR)EBO}$	4.5	-	V
<b>Collector Cutoff Current</b> $V_{CB} = 20\text{V}, I_E = 0$ $V_{CB} = 20\text{V}, I_E = 0, T_A = 150^\circ\text{C}$	2N2369 2N2369A	$I_{CBO}$	- 0.4 30	$\mu\text{A}$
<b>Collector Cutoff Current</b> $V_{CB} = 20\text{V}, V_{BE} = 0$	2N2369A	$I_{CES}$	- 0.4	$\mu\text{A}$
<b>Base Current</b> $V_{CE} = 20\text{V}, V_{BE} = 0$	2N2369A	$I_B$	- 0.4	$\mu\text{A}$
<b>Collector-emitter-cutoff current</b> $V_{CE} = 50\text{V}$		$I_{CES}$	- 50	nA
<b>ON CHARACTERISTICS <sup>(1)</sup></b>				
<b>DC Current Gain <sup>(1)</sup></b> $I_C = 10\text{mA}, V_{CE} = 1.0\text{V}$ $I_C = 10\text{mA}, V_{CE} = 1.0\text{V}, T_A = -55^\circ\text{C}$ $I_C = 10\text{mA}, V_{CE} = 0.35\text{V}, T_A = -55^\circ\text{C}$ $I_C = 30\text{mA}, V_{CE} = 0.4\text{V}$	2N2369 2N2369A 2N2369 2N2369A 2N2369A	$h_{FE}$	40 - 20 20 30	120 120 - - -

# 2N2369(A)

## NPN SWITCHING TRANSISTORS

Parameters	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS <sup>(1)</sup></b>				
<b>DC Current Gain <sup>(1)</sup></b>				
$I_C = 100\text{mA}, V_{CE} = 1.0\text{V}$	2N2369A	$h_{FE}$	20	-
$I_C = 100\text{mA}, V_{CE} = 2.0\text{V}$	2N2369		20	-
<b>Collector-emitter saturation voltage <sup>(1)</sup></b>				
$I_C = 10\text{mA}, I_B = 1.0\text{mA}$	2N2369	$V_{CE(sat)}$	-	0.25
	2N2369A		-	0.20
$I_C = 10\text{mA}, I_B = 1.0\text{mA}, T_A = 125^\circ\text{C}$	2N2369A		-	0.30
$I_C = 30\text{mA}, I_B = 3.0\text{mA}$	2N2369A		-	0.25
$I_C = 100\text{mA}, I_B = 10\text{mA}$	2N2369A		-	0.50
<b>Base-emitter saturation voltage <sup>(1)</sup></b>				
$I_C = 10\text{mA}, I_B = 1.0\text{mA}$	All Types	$V_{BE(sat)}$	0.70	0.85
$I_C = 10\text{mA}, I_B = 1.0\text{mA}, T_A = 125^\circ\text{C}$	2N2369A		0.59	-
$I_C = 10\text{mA}, I_B = 1.0\text{mA}, T_A = -55^\circ\text{C}$	2N2369A		-	1.02
$I_C = 30\text{mA}, I_B = 3.0\text{mA}$	2N2369A		-	1.15
$I_C = 100\text{mA}, I_B = 10\text{mA}$	2N2369A		-	1.60
<b>SMALL SIGNAL CHARACTERISTICS</b>				
<b>Current Gain Bandwidth Product</b>				
$I_C = 10\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}$	$f_T$	500	-	MHz
<b>Output capacitance</b>				
$V_{CB} = 5\text{V}, I_E = 0, f = 1.0\text{MHz}$	$C_{obo}$	-	4.0	pF
<b>Input capacitance</b>				
$V_{EB} = 1\text{V}, I_C = 0, f = 1.0\text{MHz}$	$C_{ibo}$	-	4.0	pF
<b>SWITCHING CHARACTERISTICS</b>				
<b>Storage Time</b>				
$I_C = I_{B1} = 10\text{mA}, I_{B2} = -10\text{mA}$	$t_s$	-	13	ns
<b>Turn-On Time</b>				
$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}, I_{B1} = 3.0\text{mA}, I_{B2} = -1.5\text{mA}$	$t_{on}$	-	12	ns
<b>Turn-Off Time</b>				
$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}, I_{B1} = 3.0\text{mA}, I_{B2} = -1.5\text{mA}$	$t_{off}$	-	18	ns

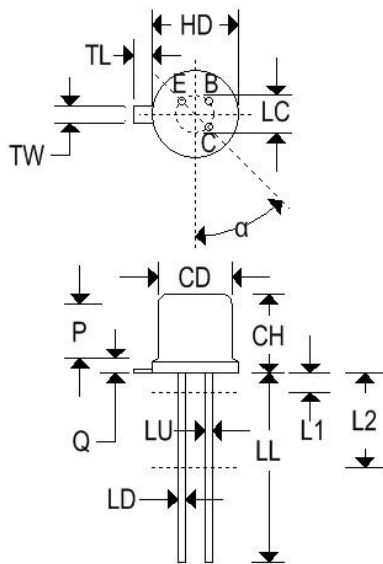
Note 1: Pulse test: Pulse width = 300 $\mu\text{s}$ , duty cycle  $\leq$  2.0%.

# 2N2369(A)

## NPN SWITCHING TRANSISTORS

### MECHANICAL CHARACTERISTICS

Case	TO-18
Marking	Alpha-numeric
Polarity	See below



TO-18				
Dim	Inches		Millimeters	
	Min	Max	Min	Max
CD	0.178	0.195	4.520	4.950
CH	0.170	0.210	4.320	5.330
HD	0.209	0.230	5.310	5.840
LC	0.100 TP		2.540 TP	
LD	0.016	0.021	0.410	0.530
LL	0.500	0.750	12.700	19.050
LU	0.016	0.019	0.410	0.480
L1	-	0.050	-	1.270
L2	0.250	-	6.350	-
P	0.100	-	2.540	-
Q	-	0.040	-	1.020
TL	0.028	0.048	0.710	1.220
TW	0.036	0.046	0.910	1.170
r	-	0.010	-	0.025
$\alpha$	45°TP		45°TP	

# 2N2369(A)

## NPN SWITCHING TRANSISTORS

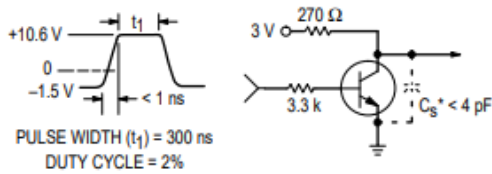


Figure 1.  $t_{on}$  Circuit — 10 mA

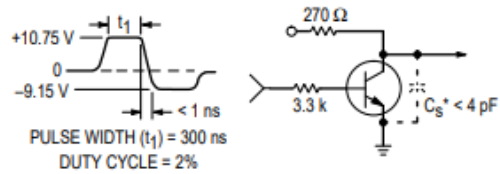


Figure 3.  $t_{off}$  Circuit — 10 mA

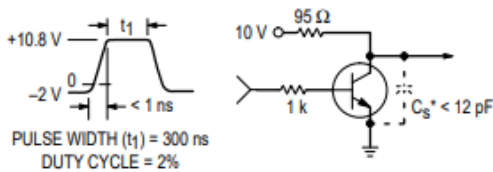


Figure 2.  $t_{on}$  Circuit — 100 mA

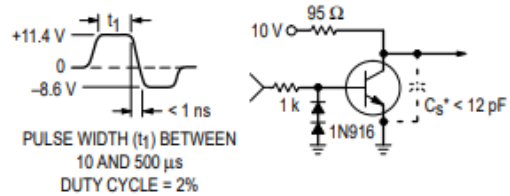


Figure 4.  $t_{off}$  Circuit — 100 mA

\* Total shunt capacitance of test jig and connectors.

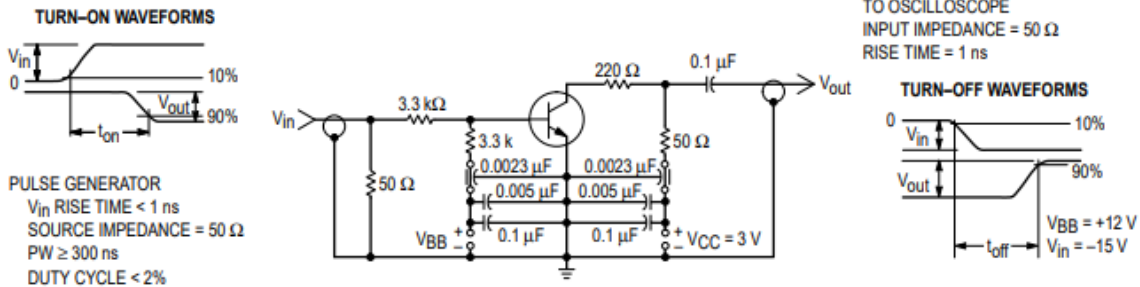


Figure 5. Turn-On and Turn-Off Time Test Circuit

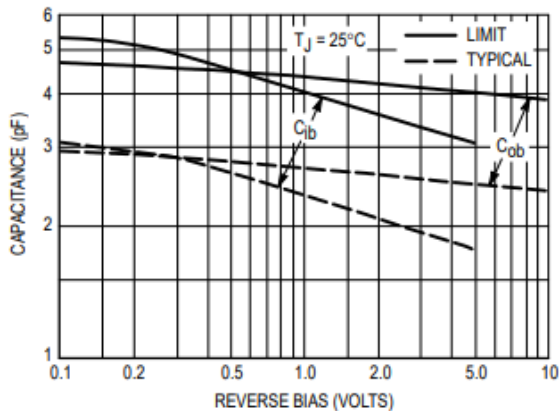


Figure 6. Junction Capacitance Variations

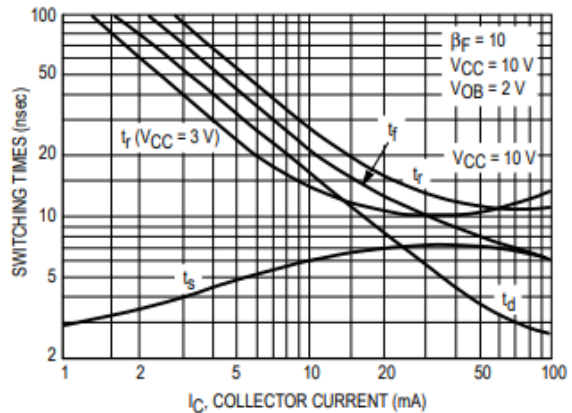


Figure 7. Typical Switching Times

# 2N2369(A)

## NPN SWITCHING TRANSISTORS

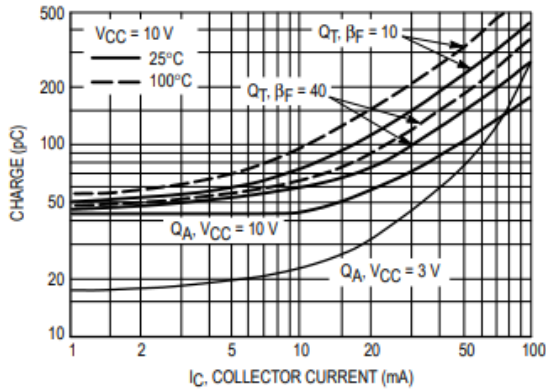


Figure 8. Maximum Charge Data

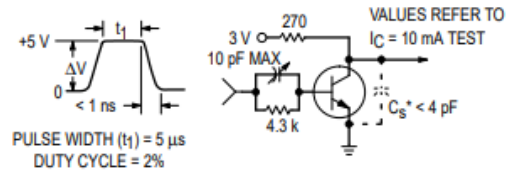


Figure 9.  $Q_T$  Test Circuit

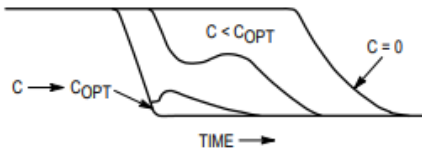


Figure 10. Turn-Off Waveform

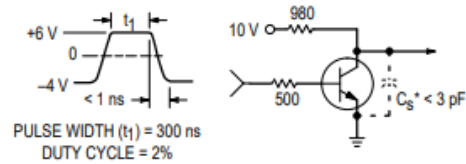


Figure 11. Storage Time Equivalent Test Circuit

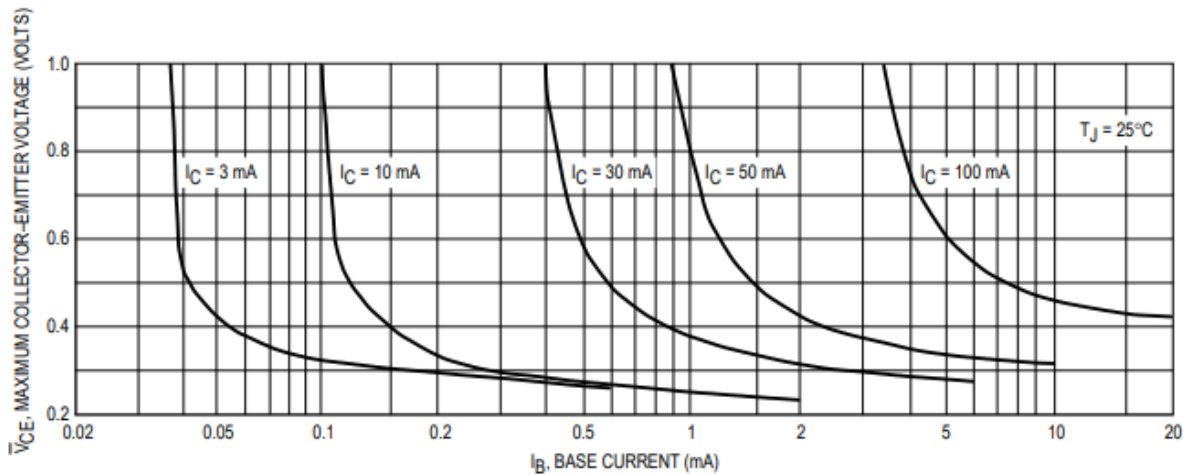


Figure 12. Maximum Collector Saturation Voltage Characteristics

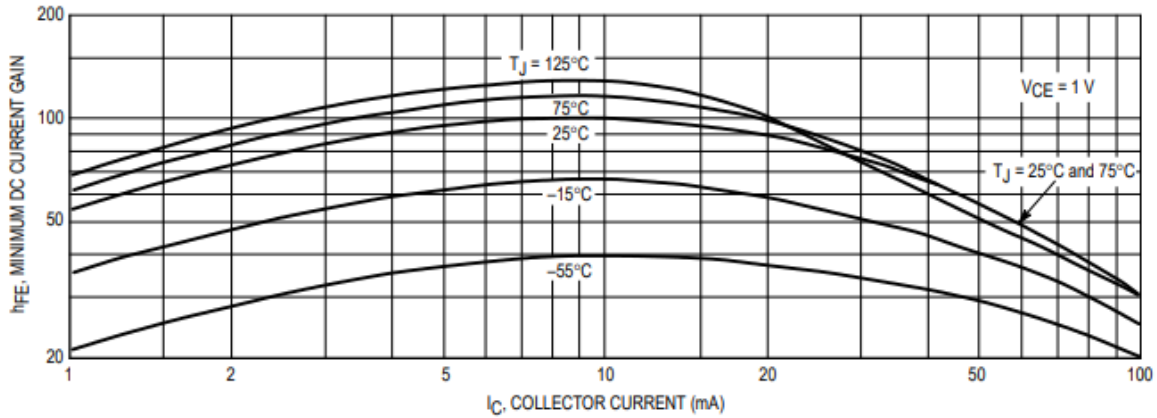


Figure 13. Minimum Current Gain Characteristics

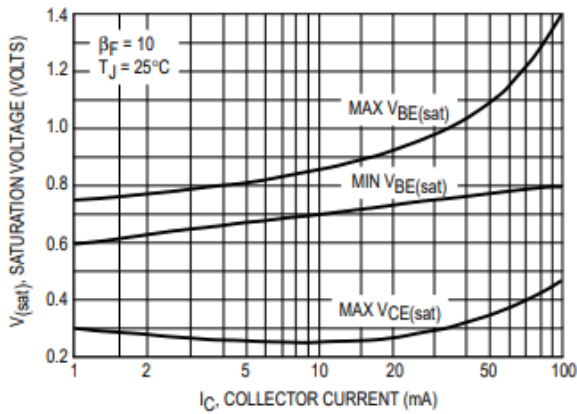


Figure 14. Saturation Voltage Limits

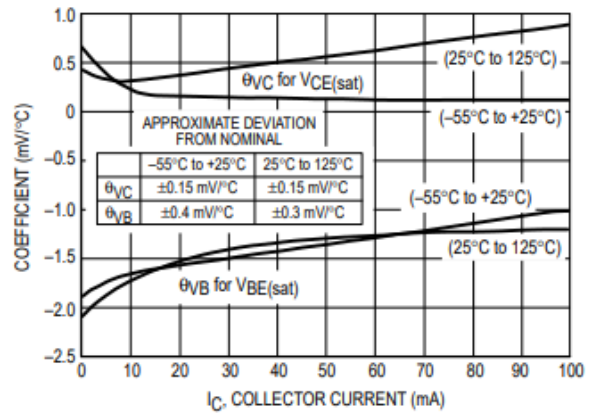


Figure 15. Typical Temperature Coefficients